Actuarial 101: Actuarial Analyses for Self-Insurers and Captives

FMI Asset Protection Conference
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Agenda

- Uniqueness of Insurance
- Actuarial Terminology
- Types and Uses of Actuarial Analyses
- Predictive Analytics

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Uniqueness of Insurance – Overview

- Typical Business
  - Cost of goods is generally known up front
  - E.g., manufacturing, retail
- Insurance
  - Cost of a policy equal to premium paid up front (e.g., guaranteed cost policy)
- Self-Insurance
  - Cost of a policy not known until settlement of all claims
  - This cost needs to be estimated

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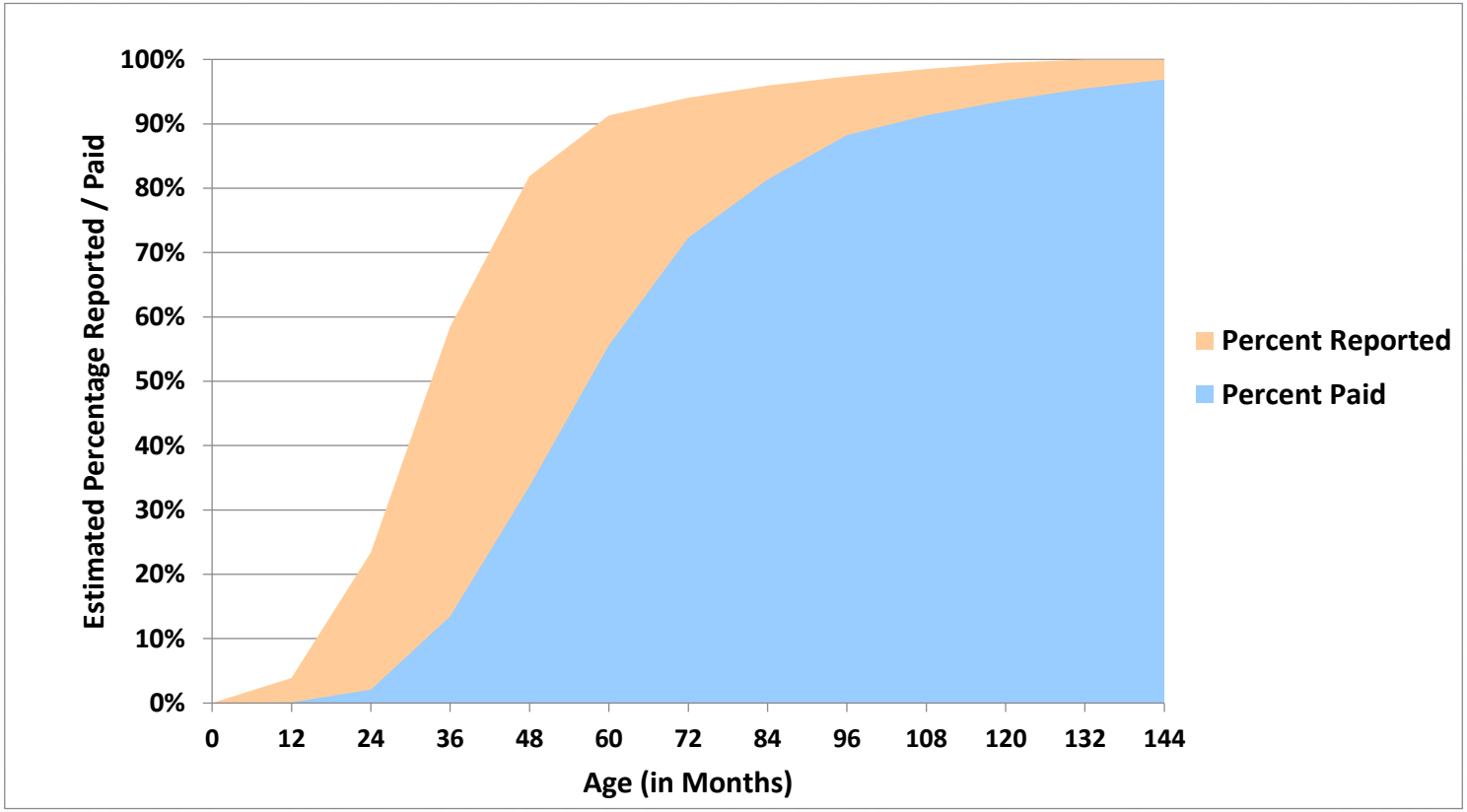
Uniqueness of Insurance

Sample Reporting and Payment Pattern



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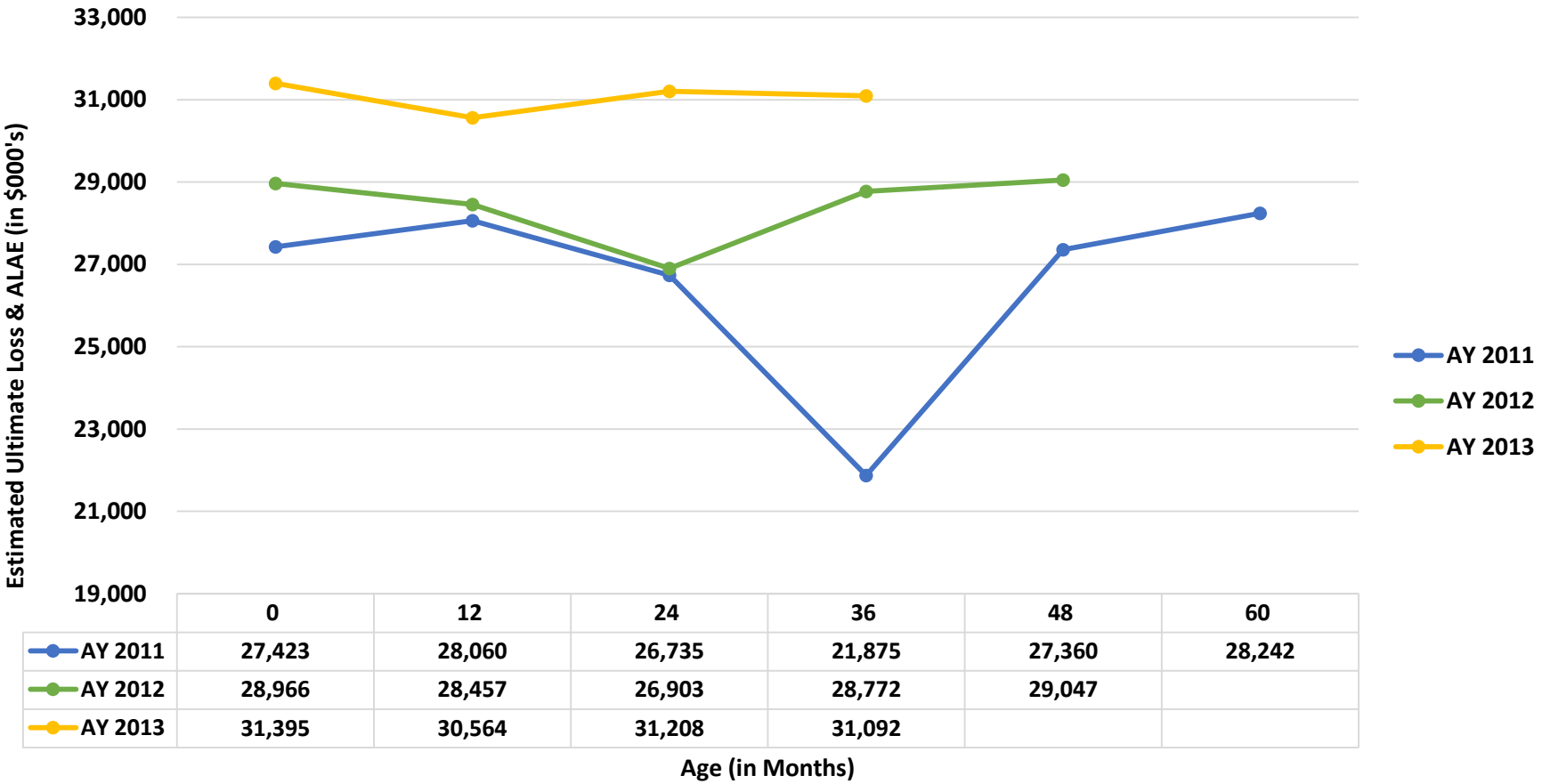
Uniqueness of Insurance

Sample Ultimate Losses Over Time



	0	12	24	36	48	60
AY 2011	27,423	28,060	26,735	21,875	27,360	28,242
AY 2012	28,966	28,457	26,903	28,772	29,047	
AY 2013	31,395	30,564	31,208	31,092		

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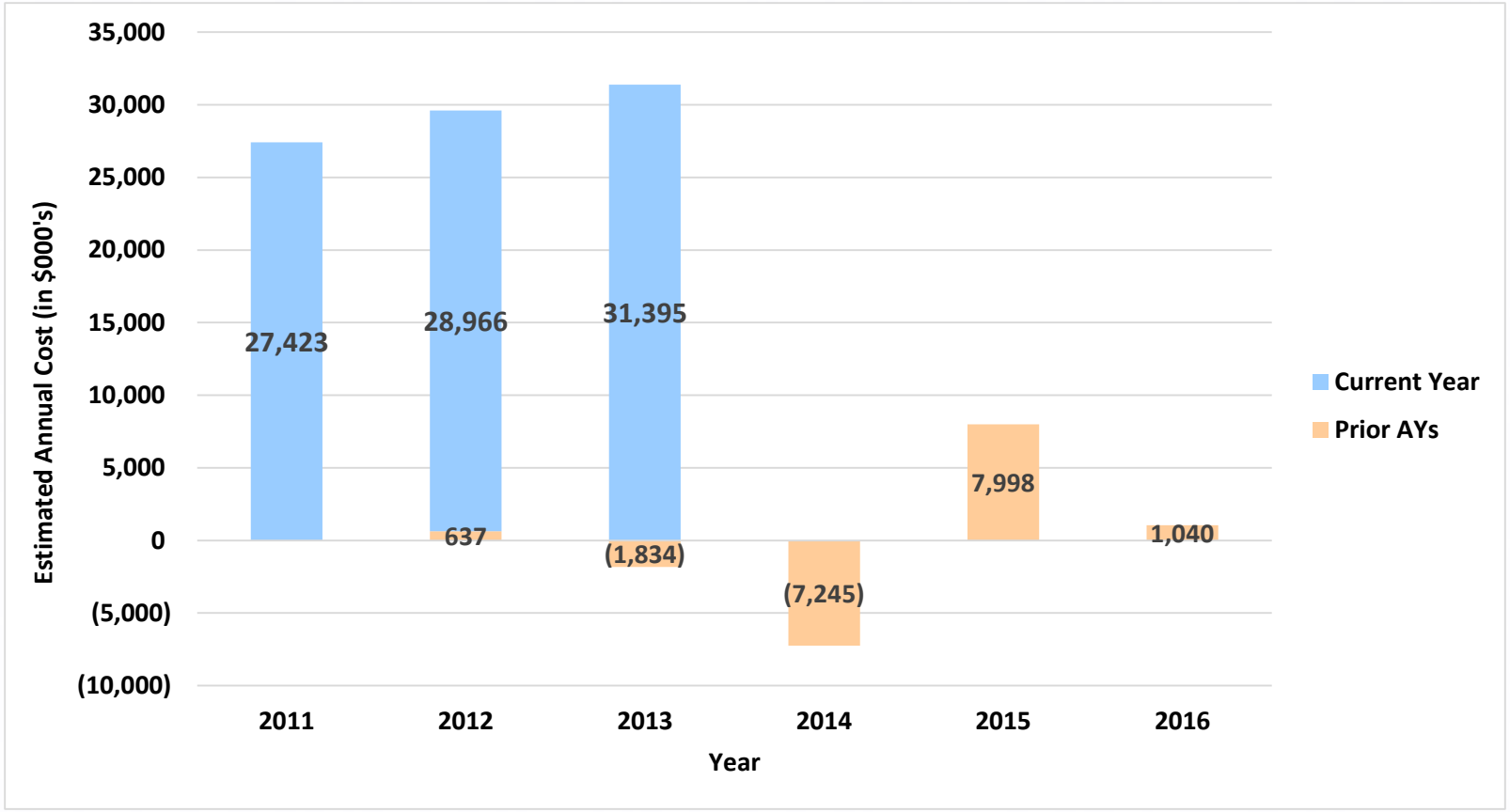
Uniqueness of Insurance

Sample Annual Cost



Estimated Annual Cost = Projected Ultimate Loss + Change in Estimated Ultimate Losses from Prior Accident Years

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Uniqueness of Insurance

Sample Loss Development Triangle

Cumulative Incurred Loss and ALAE

Accident Year	12 Months	24 Months	36 Months	48 Months	60 Months
2010	100,000	125,000	135,000	145,000	150,000
2011	110,000	130,000	145,000	155,000	
2012	200,000	240,000	265,000		
2013	175,000	210,000			
2014	225,000				

Development Factors

Accident Year	12 Months	24 Months	36 Months	48 Months	60 Months
2010	1.250	1.080	1.074	1.034	
2011	1.182	1.115	1.069		
2012	1.200	1.104			
2013	1.200				
2014					
Wtd. Avg.	1.205	1.101	1.071	1.034	
Avg. Ex. Hi/Lo	1.200	1.104			

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Actuarial Terminology – Ultimate Losses

- Paid
- Case Reserves
- Case Incurred = Paid + case reserves
- Incurred but not Reported (“IBNR”) reserve
- Ultimate = Paid + case reserves + IBNR reserves

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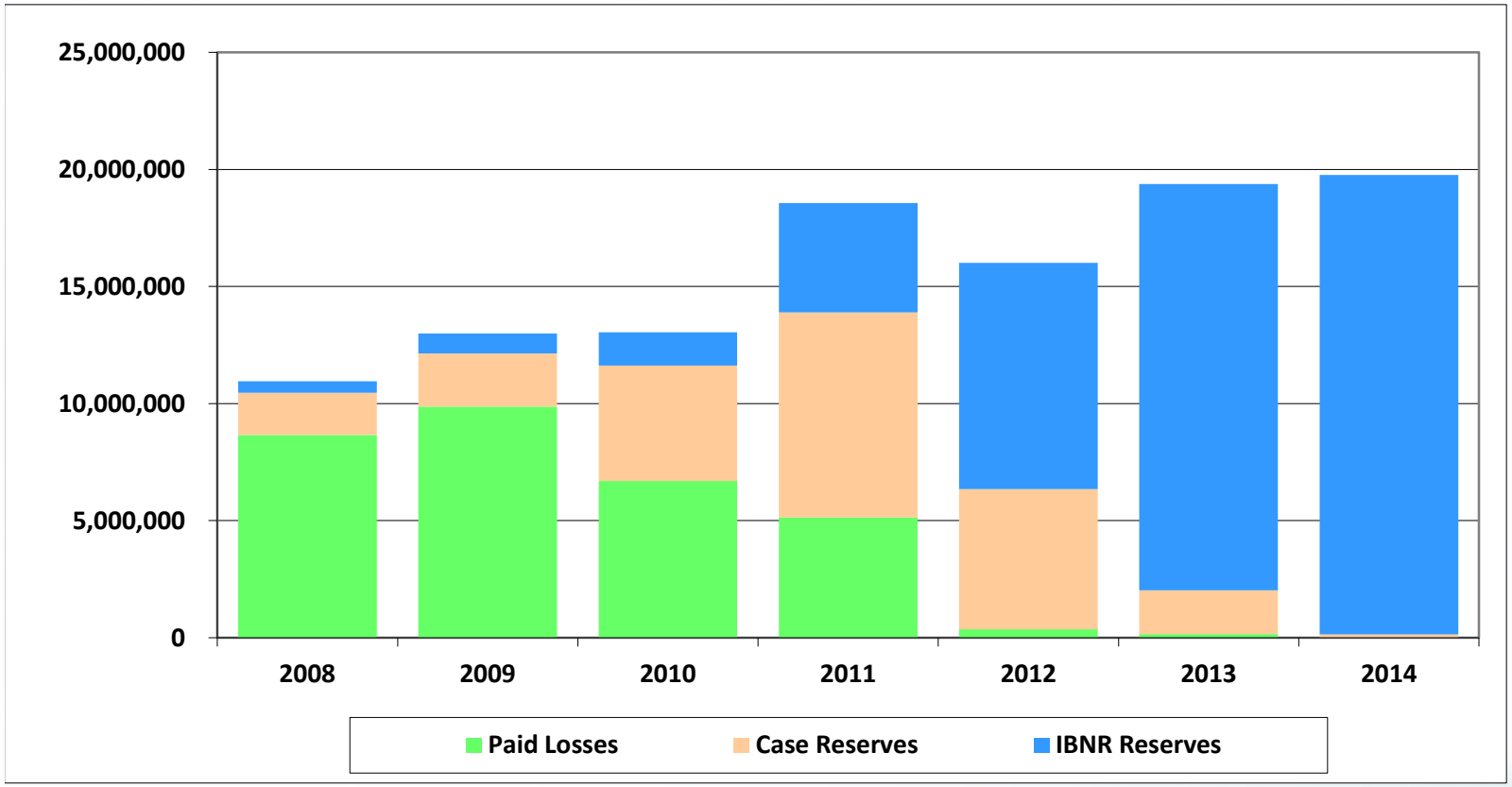
Actuarial Terminology

Sample Breakdown of Ultimate Losses



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Actuarial Terminology – Reserves

- Components of a Loss Reserve
  - Case reserves
  - IBNR reserves
    - Late reported claims – pure IBNR
    - Future incurred development on known claims
    - Reopened claims
- Indicated Loss Reserve
- Carried Loss Reserve

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Actuarial Terminology – Sections of a Report

- Scope and Intended Purpose
- Disclosures and Limitations
- Summary of Findings
- Analysis
- Supporting Exhibits

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Types and Uses of Actuarial Analyses

- Reserves and Cash Flow
- Funding/Premium
- Feasibility
- Pro Forma Financial Projections
- Economic Capital Modeling

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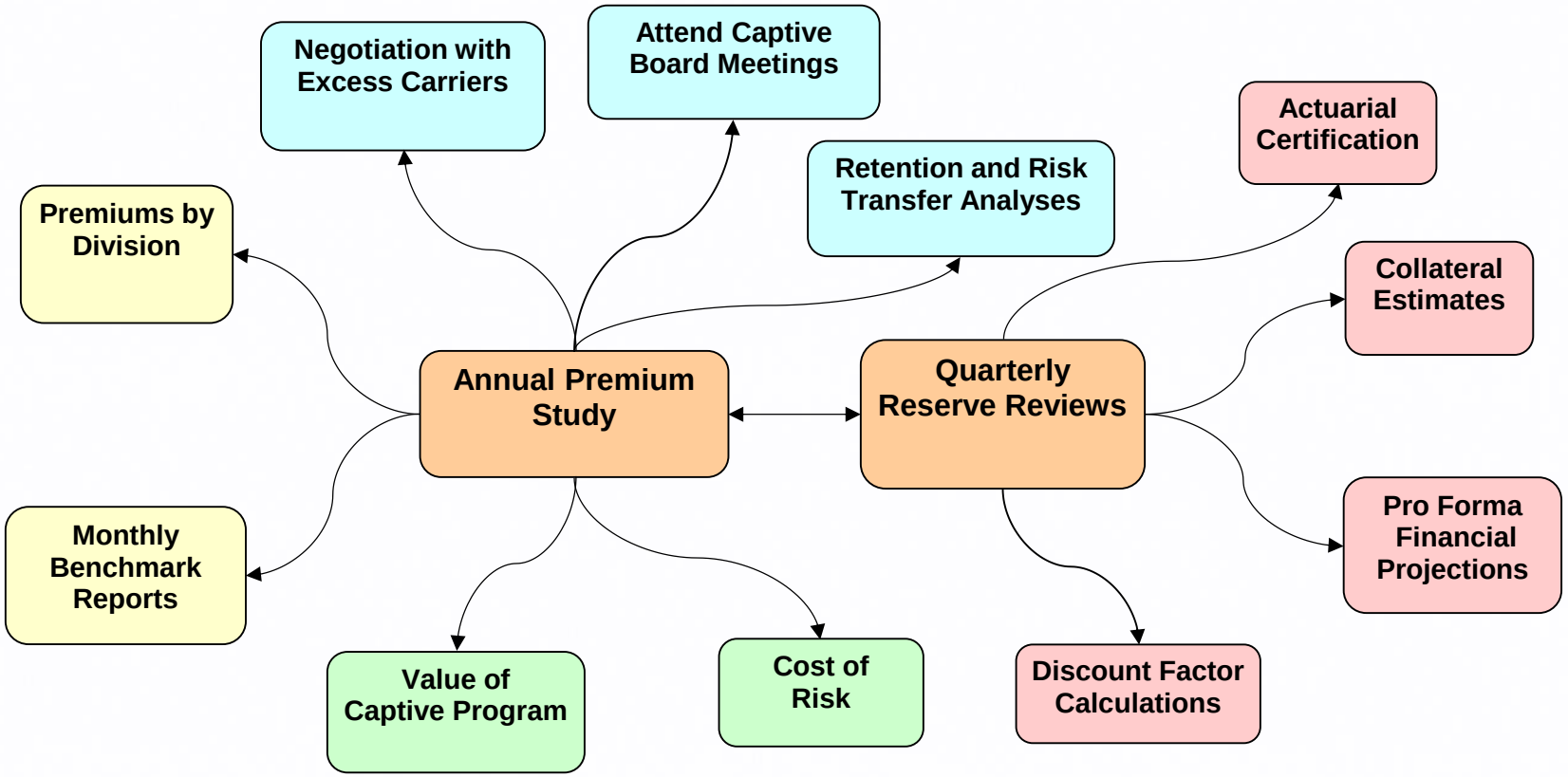
Types and Uses of Actuarial Analyses



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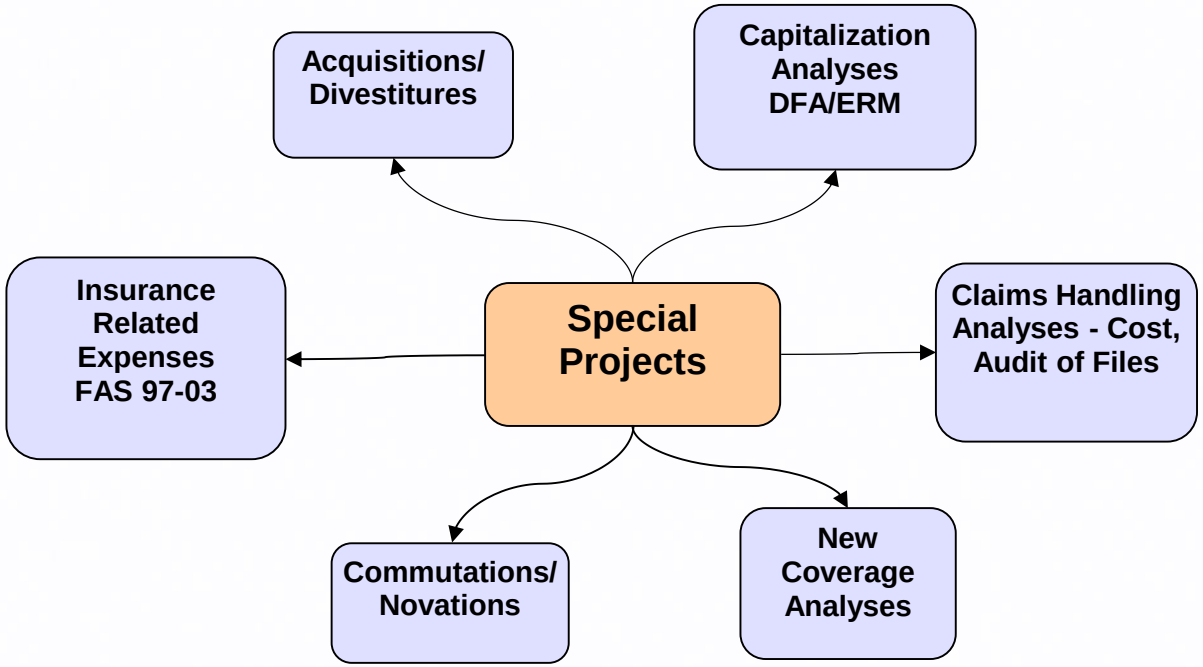
Types and Uses of Actuarial Analyses



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Types and Uses of Actuarial Analyses

Reserves and Cash Flow – Captive FIT Benefits

- Timing Benefit
  - Deductibility of discounted loss reserves
  - No need to defer deduction until payment
- Tax Deductibility of Premium
- Qualification Criteria
  - Take on insurance risk
  - Exhibit risk shifting and risk distribution (i.e., risk transfer)
  - Constitute insurance in the commonly accepted sense

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Types and Uses of Actuarial Analyses

Reserves and Cash Flow – Captive FIT Benefits

Actual Savings less Expenses

(1)	Ultimate Losses for 2016	162,100,000
(2)	Estimated Tax Benefit	2,139,432
(3)	Annual Captive Expenses	325,000
	Professional Fees	50,000
	Management Fees	100,000
	Other	25,000
	Premium Tax	150,000
(4)	Annual Captive Expenses (After Tax)	211,250
(5)	"Net" Estimated Tax Benefit	**1,928,182**

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Types and Uses of Actuarial Analyses

Reserves and Cash Flow – Captive FIT Benefits

Calendar Year	(1) Discounted Incurred Losses	(2) Paid Losses	(3) Difference (1)-(2)	(4) Time (Years)	(5) Present Value of (3)	(6) Estimated Tax Benefit
2016	150,000,000	35,889,299	114,110,701	0.5	112,986,430	39,545,251
2017	1,000,000	41,870,849	(40,870,849)	1.5	(39,674,677)	(13,886,137)
2018	1,250,000	23,926,199	(22,676,199)	2.5	(21,580,914)	(7,553,320)
2019	2,000,000	19,140,959	(17,140,959)	3.5	(15,993,169)	(5,597,609)
2020	1,500,000	11,963,100	(10,463,100)	4.5	(9,571,050)	(3,349,868)
2021	2,000,000	9,570,480	(7,570,480)	5.5	(6,789,260)	(2,376,241)
2022	1,000,000	7,177,860	(6,177,860)	6.5	(5,431,714)	(1,901,100)
2023	1,000,000	5,981,550	(4,981,550)	7.5	(4,294,011)	(1,502,904)
2024	1,500,000	3,588,930	(2,088,930)	8.5	(1,765,316)	(617,861)
2025	850,000	2,990,775	(2,140,775)	9.5	(1,773,656)	(620,780)
Total	162,100,000	162,100,000	0		6,112,663	**2,139,432**

Interest Rate: 2.0%

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Types and Uses of Actuarial Analyses

Reserves and Cash Flow – Monthly Benchmark Report

- Actual vs. Expected Emergence of Losses
  - Supplement to a full actuarial analysis
  - Incurred or paid basis
  - Expected based on actuarial analysis

- Monitoring Device
  - Quickly assess loss emergence (e.g., if actual cost > budgeted cost → under-budgeted)
  - Identify problems and take action
    - Claims handling changes
    - Other operational changes

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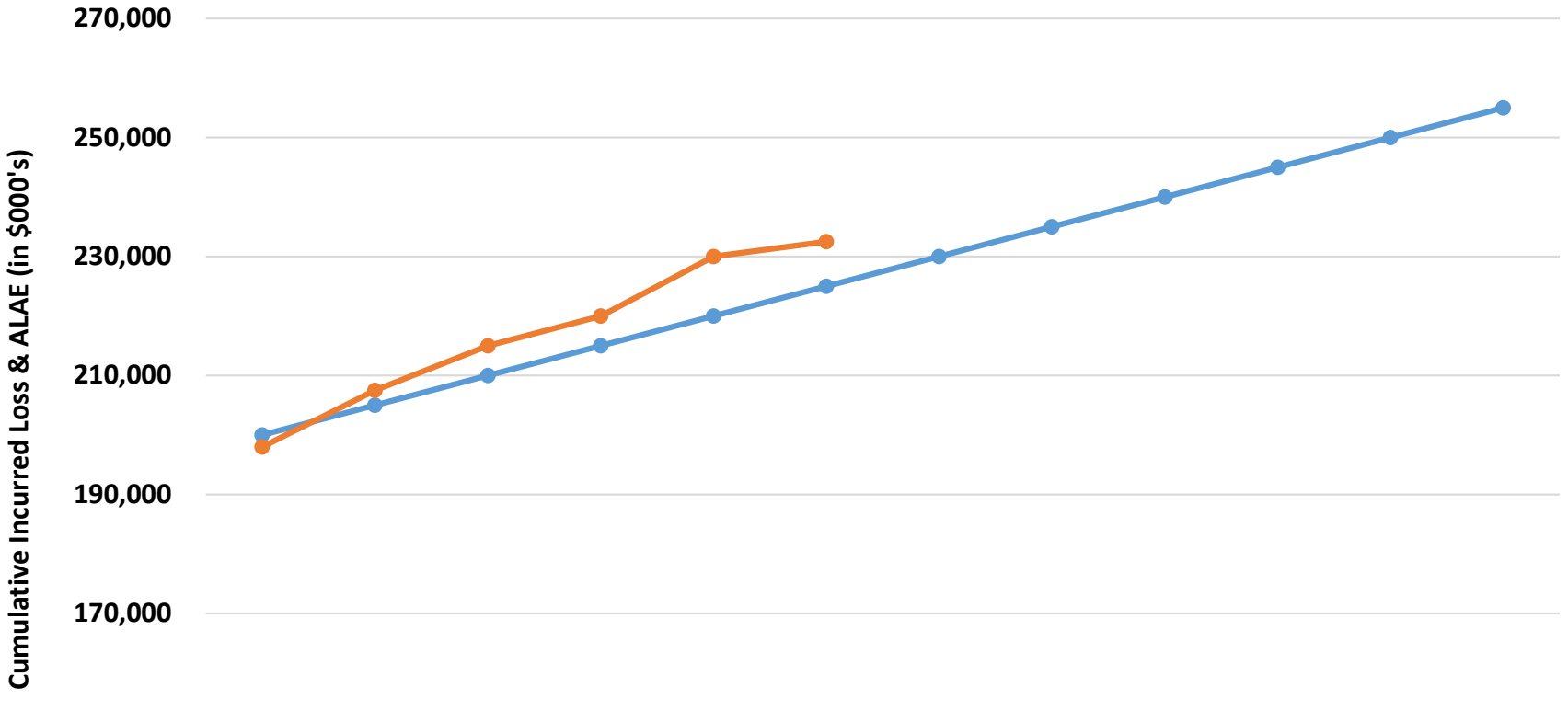
Types and Uses of Actuarial Analyses

Reserves and Cash Flow – Monthly Benchmark Report



	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Expected	200,000	205,000	210,000	215,000	220,000	225,000	230,000	235,000	240,000	245,000	250,000	255,000
Actual	198,000	207,500	215,000	220,000	230,000	232,500						

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Types and Uses of Actuarial Analyses

Pro Forma Financial Projections

- Estimated Future Income Statements/Balance Sheets
  - 5 future years
  - Scenario testing (e.g., expected scenario, adverse scenario, etc.)
- Required in applications for captive programs
- Often performed in conjunction with feasibility studies
- Other Situations – change in business plan, loss portfolio transfers, etc.

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Types and Uses of Actuarial Analyses

Pro Forma Financial Projections – Income Statement

	Year 2016	Year 2017	Year 2018
Net Underwriting Income			
Earned Premium plus Other Income	6,680,735	7,014,772	7,365,511
Underwriting Expenses	6,680,736	7,013,773	7,363,462
Total Net Underwriting Income	(1)	999	2,049
Net Investment Income	47,063	125,264	188,050
Profit (Loss) Before Tax	47,062	126,263	190,099
Federal Tax	18,825	50,506	76,040
Net Income	28,237	75,757	114,059

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Types and Uses of Actuarial Analyses

Pro Forma Financial Projections – Balance Sheet

	Year 2016	Year 2017	Year 2018
Assets			
Invested Assets	6,072,130	10,755,020	14,506,514
All Other	2,195,154	2,345,199	2,459,404
Total Assets	8,267,284	13,100,219	16,965,918
Liabilities			
Outstanding Loss & LAE Reserve	5,775,068	10,545,673	14,307,617
All Other	213,979	200,551	190,245
Total Liabilities	5,989,047	10,746,224	14,497,862
Capital/Retained Earnings			
Initial Capital	2,250,000	2,250,000	2,250,000
Retained Earnings	28,237	103,994	218,053
Total Capital	2,278,237	2,353,994	2,468,053
Total Liabilities & Capital	8,267,284	13,100,218	16,965,915

Predictive Analytics – Overview

- The use of data to determine patterns and predict future outcomes and trends

- Retail companies already make use of predictive analytics
  - Targeted coupons based on past purchases

- Benefits in a self-insurance setting
  - Identification of claims handling efficiencies
  - Early recognition of potentially large claims (e.g., claim scoring)

- Requires a large amount of data
  - Newer technologies require less data and can handle “noisy” data

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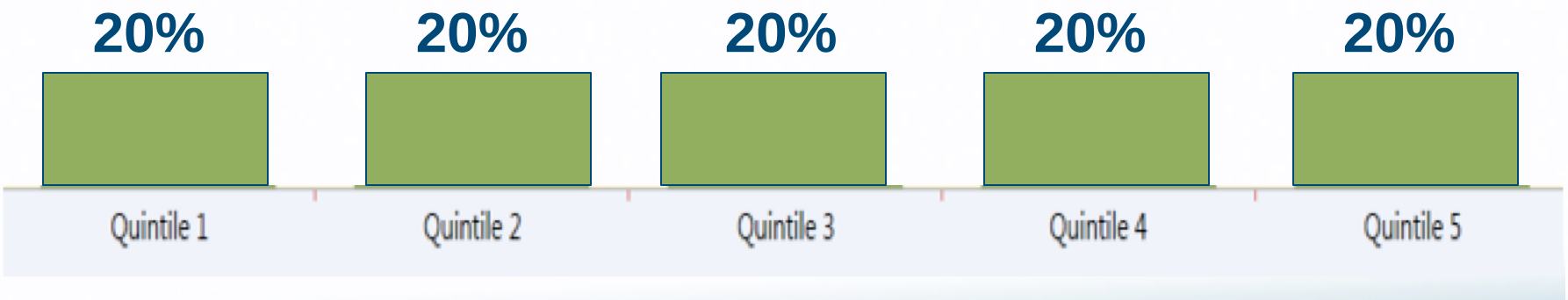
Decision Support – Claims Example

- Quickly identify “creeping catastrophic” claims
  - Less than 20% of claims cause 80% of losses
- Create better claims outcomes with more timely and more detailed information
  - Loss cost reductions that generally range from 3-6% per year
- “Operationalize” into claims/medical protocols/rules
- Integrate management of all available sources of data/information
- “Second pair of eyes” on existing claim/medical vendors
- Ancillary benefits (e.g., TPA transformation, data driven culture)

Segmentation Analysis

Divide All Claims into 5 buckets of 20% each

- After Scoring distribute by Risk Score
- Lowest Risk to the Left
- Worst Claim far right vs. Best Claim far left



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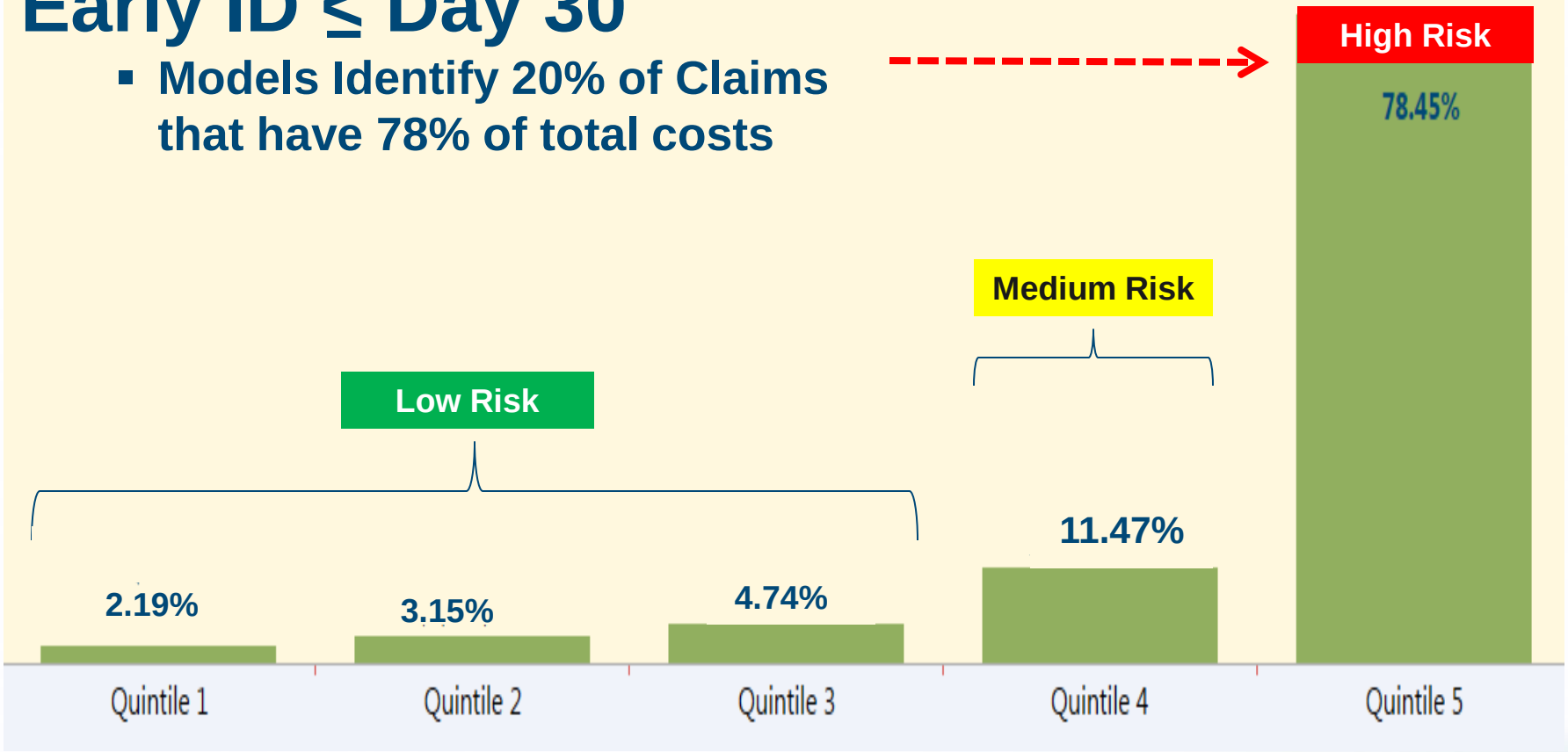
Predictive Modeling in Action

Early ID ≤ Day 30

- Models Identify 20% of Claims that have 78% of total costs



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Conclusion

- The business of insurance is unique, particularly with respect to uncertainty.
- There are several services that actuaries can provide to address this uncertainty.
- As such, actuaries play a key role in the risk management process.

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Questions and Answers

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